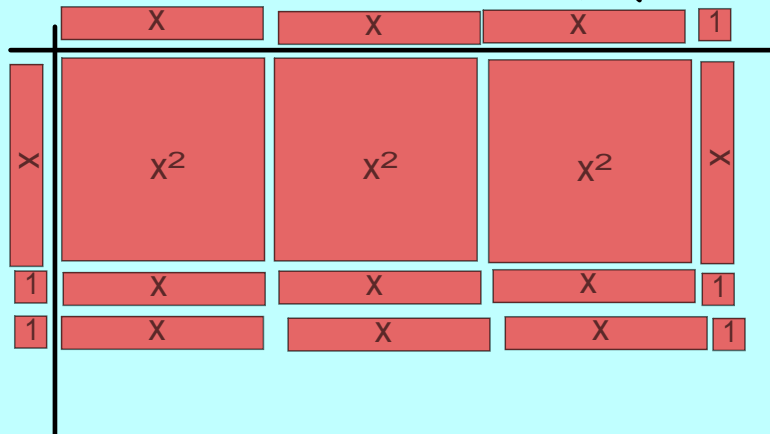


Factor: $3x^2 + 7x + 2 = (3x + 1)(x + 2)$

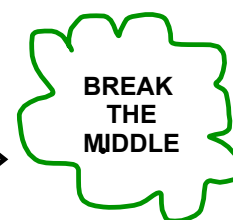


3.8(4.4) Factoring Complex Trinomials ($ax^2 + bx + c$, $a \neq 1$)

Expand $(x + 4)(2x + 3)$. What are the x-terms?

$$(x + 4)(2x + 3) = 2x^2 + 3x + 8x + 12$$

$$= 2x^2 + 11x + 12$$



To factor $2x^2 + 11x + 12$, we need to do these steps in reverse order.

How do the numbers 3 and 8 relate to 2, 11, and 12?

$$3 + 8 = 11$$

$$3 \times 8 = 2 \times 12$$

⇒ Multiple the 1st and 3rd

Once you have broken the middle term, you can factor by grouping

$$= 2x^2 + 11x + 12$$

$$= 2x^2 + \overset{\text{split}}{3x + 8x} + 12$$

GCF GCF

$$= x(2x+3) + 4(2x+3)$$

$$= xa + 4a$$

$$= a(x+4)$$

$$= (2x+3)(x+4)$$

$$2 \times 12 = 24$$

$$\left. \begin{array}{l} 1 \times 24 \\ 2 \times 12 \\ \underline{3 \times 8} \\ 4 \times 6 \end{array} \right\} = \underline{\underline{11}}$$

$$\text{let } a = (2x+3)$$

Ex. Factor $6m^2 + 13m - 5$

Numbers multiply to: -30 (product)

Numbers add to: 13 (sum)

Numbers are:

15 and -2 (integers)

$$1^{\text{st}} \times 3^{\text{rd}} = \underline{\underline{-30}}$$

$$\left. \begin{array}{l} 1 \times 30 \\ \underline{2 \times 15} \\ 3 \times 10 \end{array} \right\}$$

$$\underline{15} + \underline{-2} = 13$$

This technique is called SPI
(sum, product, integers)

Ex. Factor $6m^2 + 13m - 5$

Numbers are: -2 and 15

Now factor by grouping:

$$\begin{aligned} &6m^2 + 15m - 2m - 5 \\ &3m(2m+5) - 1(2m+5) \\ &(3m-1)(2m+5) \end{aligned}$$

$$6m^2 + 13m - 5 = 6m^2 - 2m + 15m - 5$$

$$= 2m(3m-1) + 5(3m-1)$$

$$= (2m+5)(3m-1)$$

$$\begin{aligned} 2m+5 &= 0 & \text{or} & & 3m-1 &= 0 \\ \frac{2m}{2} &= \frac{-5}{2} & & & \frac{3m}{3} &= \frac{1}{3} \\ x &= -\frac{5}{2} & & & m &= \frac{1}{3} \end{aligned}$$

Ex. Factor: $6x^2 - 13x + 6$

$$6 \times 6 = 36$$

$$= 6x^2 - 4x - 9x + 6$$

$$= 2x(3x-2) - 3(3x-2)$$

$$= (3x-2)(2x-3)$$

$$\begin{array}{l} \underline{1 \times 36} \\ 2 \times 18 \\ 3 \times 12 \\ \underline{4 \times 9} \\ 6 \times 6 \end{array} \left. \vphantom{\begin{array}{l} 1 \times 36 \\ 2 \times 18 \\ 3 \times 12 \\ 4 \times 9 \\ 6 \times 6 \end{array}} \right\} -13$$

$$\underline{-4} + \underline{-9} = -13$$

Ex. Factor: $10x^2 - 11x - 6$

$$6 \times 10 = 60$$

$$10x^2 + 4x - 15x - 6$$

$$\frac{10x^2 + 4x}{2x} \quad \frac{-15x - 6}{3}$$

$$2x(5x+2) - 3(5x+2)$$
$$(2x-3)(5x+2)$$

$$1 \times 60$$

$$2 \times 30$$

$$(4 \times 15)$$

$$4 + (-15) = -11$$

Ex. Factor: $4x^2 - 5xy - 6y^2$

Assigned Work:

p.223-224 #3bc, 5abc, 6,

#7abc, 11, 15, 17(Challenging)

Look for common factors first!!!

